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**HSP90 enhances mitophagy to improve the resistance of cardiomyocytes to heat stress in Wenchang chicken**

Jiachen Shi1\*, Endong Bao2, Xiaohui Zhang3

\*lead presenter

1 2857571696@qq.com, School of Life and Health Sciences, Hainan University, Hainan University, Haikou 570100, China

2 Department of Basic Veterinary Medicine, College of Veterinary Medicine, Nanjing Agricultural University, Nanjing 210095, China

3 Key Laboratory of Tropical Animal Breeding and Epidemic Disease Research of Hainan Province, School of Tropical Agriculture and Forestry, Hainan University, Haikou 570100, China

**Abstract:**

**Background:** Global warming presents new challenges to the survival of global animal populations, and the rate of animal heat-stressed death due to high temperatures will only increase in the future. Acute myocardial injury caused by heat stress is believed to be the key factor in the animal sudden death, As a typical tropical species, Wenchang chicken has a recognized ability to resist heat-stress death. But their resistance mechanism is still unclear.

**Methods:** In this study, we established an acute heat stress model in vivo through placing Wenchang chickens into an artificial climate chamber with 42±1℃ and the relative humidity of 65% for a continuous 5 h. The chickens were divided into heat stress survival group (HSS) and heat stress death group (HSD) based on whether they survived after exposure to heat stress. Metabolomics and transcriptomics analysis were conducted to investigate the mechanisms underlying the resistance of cardiomy to heat stress damage. Heat-stressed primary cardiomyocytes of Wenchang chicken (PCW) was used to further investigate the related molecular mechanism in vitro.

**Results:** The results showed that metabolomics and transcriptomics analysis revealed significant changes in purine metabolism, tricarboxylic acid cycle(TCA cycle), apoptosis and autophagy-related pathways in the heart tissues of heat-stressed dead and survival chickens. Compared to those in HSD, the myocardial cells in HSS showed higher expression of HSP90 and lower level of mitochondrial autophagy, as well as more intact mitochondrial structure and function. Mechanism research found that the HSP90 in heat-stressed myocardial cells can enhance its interaction level with Beclin-1, thereby reducing the mitochondrial autophagy induced by the Pink1/parkin pathway, thereby improving the heat stress resistance of the cells. **Conclusion:** In summary, heat stress can disrupt the integrity of mitochondrial structure and function, causing metabolic disorders related to energy metabolism and DNA synthesis in heat-stressed myocardial cells of Wenchang chicken, leading to cell apoptosis. The process of mitochondrial autophagy mediated by HSP90-Beclin-1 and Pink1/parkin is an effective mechanism for enhancing the resistance of hearts to heat stress in Wenchang chickens.

**Keywords:** HSP90; mitophagy; heat stress damage; Cardiomyocytes; Wenchang chicken